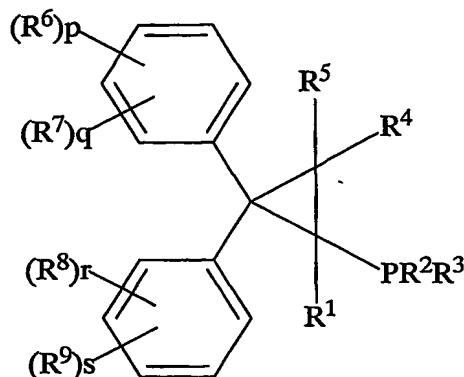


CLAIMS

1. A phosphine compound of formula (1),



(1)

wherein R^1 is a hydrogen atom, an alkyl group, a cycloalkyl group or a phenyl group which may be substituted; R^2 and R^3 are each, the same or different, an alkyl group, a cycloalkyl group or a phenyl group which may be substituted; R^4 and R^5 are each, the same or different, a hydrogen atom, an alkyl group, a cycloalkyl group or a phenyl group which may be substituted; R^6 , R^7 , R^8 and R^9 are each, the same or different, an alkyl group, a cycloalkyl group, a phenyl group which may be substituted, an alkoxy group, a dialkylamino group, a halogen atom, a benzyl group, a naphthyl group or a halogenated alkyl group; R^6 and R^7 , or R^8 and R^9 each may be combined to form, a fused ring, a trimethylene group, a tetramethylene group or a methylenedioxy group; p , q , r and s are each an integer of from 0 to 5; and $p + q$, and $r + s$ are each in the range of from 0 to 5.

2. A palladium-phosphine complex which can be obtained by reacting the phosphine compound of claim 1 with a palladium compound.

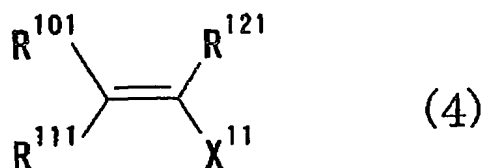
3. The palladium-phosphine complex of claim 2, wherein the palladium compound is a palladium salt or a palladium complex in which the valency of palladium is 4, 2 or 0.

5

4. A manufacturing method of an unsaturated compound or an aromatic compound by the use of palladium-phosphine complexes mentioned in claim 2 or 3 as a catalyst.

10 5. A manufacturing method of an unsaturated compound or an aromatic compound by the use of the phosphine compound mentioned in claim 1 and a palladium compound.

6. The manufacturing method of claim 4 or 5, which comprises
15 reacting a compound of formula (3) or (4) below:

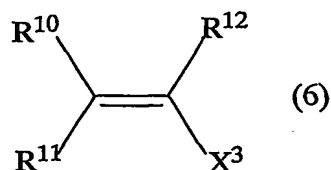


wherein, in formula (3), Ar^1 is an aryl group which may be substituted or a heteroaryl group which may be substituted; X^1
20 is a chlorine atom, a bromine atom, an iodine atom, a trifluoromethanesulfonyloxy group, a methanesulfonyloxy group or a para-toluenesulfonyloxy group and m^1 is an integer of 1 to 4, and,

in formula (4), R^{101} , R^{111} and R^{121} are each, the same or
25 different, a hydrogen atom, an alkyl group, an aryl group which may be substituted, a heteroaryl group which may be substituted,

an alkoxy carbonyl group or a cyano group; X^{11} is a chlorine atom, a bromine atom, an iodine atom, a trifluoromethanesulfonyloxy group, a methanesulfonyloxy group or a para-toluenesulfonyloxy group,

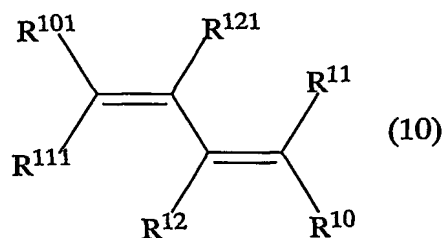
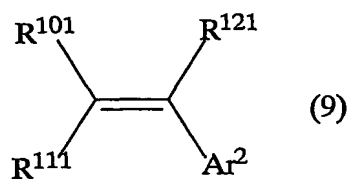
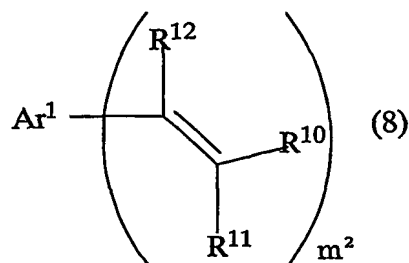
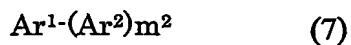
5 with a compound, of formula (5) or (6) below,



wherein, in formula (5), Ar^2 is an aryl group which may be substituted or a heteroaryl group which may be substituted; X^2 is $B(OR^{13})(OR^{14})$, $Sn(R^{15})_3$, MgX , ZnX , $Al(R^{15})_2$ or Li , and,

10 in formula (6), R^{10} , R^{11} and R^{12} are each, the same or different, a hydrogen atom, an alkyl group, an aryl group which may be substituted, a heteroaryl group which may be substituted, an alkoxy carbonyl group or a cyano group; R^{10} and R^{12} may be combined to form a single bond, forming together with the existing double
15 bond a triple bond; X^3 is a hydrogen atom, $B(OR^{13})(OR^{14})$, $Sn(R^{15})_3$, MgX , ZnX , $Al(R^{15})_2$ or Li ; R^{13} and R^{14} are each, the same or different, a hydrogen atom, an alkyl group, or, combined to form an ethylene group or a 1,2-dimethylethylene group; R^{15} is an
20 alkyl group, and X is a chlorine atom, a bromine atom or an iodine atom,
to give a compound of formula (7), (8), (9) or (10),

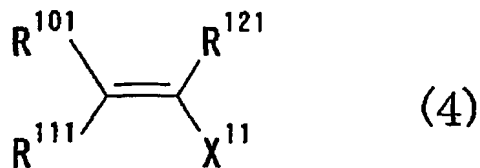
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wherein Ar^1 , Ar^2 , R^{10} , R^{11} , R^{12} , R^{101} , R^{111} and R^{121} are as defined above and m^2 is an integer of 1 to 4.

5

7. A manufacturing method of claim 4 or 5, which comprises reacting a compound of formula (3) or (4) below,



10 wherein, in formula (3), Ar^1 is an aryl group which may be substituted or a heteroaryl group which may be substituted; X^1 is a chlorine atom, a bromine atom, an iodine atom, a trifluoromethanesulfonyloxy group, a methanesulfonyloxy group

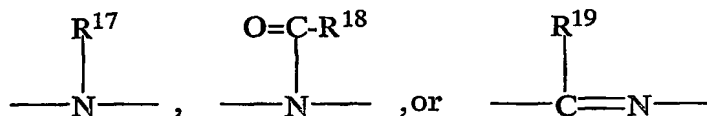
or a para-toluenesulfonyloxy group and m^1 is an integer of from 1 to 4, and,

in formula (4), R^{101} , R^{111} and R^{121} are each, the same or different, a hydrogen atom, an alkyl group, an aryl group which may be substituted, a heteroaryl group which may be substituted, an alkoxy carbonyl group or a cyano group; X^{11} is a chlorine atom, a bromine atom, an iodine atom, a trifluoromethanesulfonyloxy group, a methanesulfonyloxy group or a para-toluenesulfonyloxy group,

with an oxygen compound or a nitrogen compound of formula (11) below,

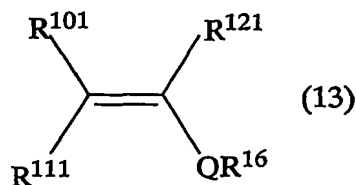
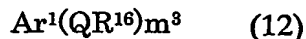


wherein R^{16} is an alkyl group, an aryl group which may be substituted or a heteroaryl group which may be substituted; Q is an oxygen atom,



wherein R^{17} , R^{18} and R^{19} are each a hydrogen atom, an alkyl group, an aryl group which may be substituted or a heteroaryl group which may be substituted; and R^{16} and R^{17} may be combined to form a divalent aromatic ring which may be substituted,

to give a compound of formula (12) or (13) below,



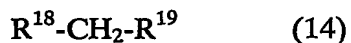
wherein Ar^1 , Q, R^{16} , R^{101} , R^{111} and R^{121} are as defined above and

m^3 is an integer of 1 to 4.

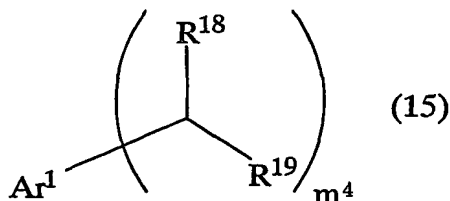
8. The manufacturing method of claim 4 or 5, which comprises reacting an aromatic compound of formula (3),



5 wherein Ar^1 is an aryl group which may be substituted or a heteroaryl group which may be substituted; X^1 is a chlorine atom, a bromine atom, an iodine atom, a trifluoromethanesulfonyloxy group, a methanesulfonyloxy group or a para-toluenesulfonyloxy
10 group, and m^1 is an integer of from 1 to 4,
with a carbonyl compound or a cyano compound of formula (14),



wherein R^{18} is a hydrogen atom, CO_2R^{20} , $\text{C}(=\text{O})\text{R}^{21}$ or a cyano group;
 R^{19} is CO_2R^{22} , $\text{C}(=\text{O})\text{R}^{23}$ or a cyano group; R^{20} , R^{21} , R^{22} and R^{23} are
15 each an alkyl group, an aryl group which may be substituted or a heteroaryl group which may be substituted,
to give a compound of formula (15),



wherein Ar^1 , R^{18} and R^{19} are as defined above and m^4 is an integer
20 of 1 to 4.

9. The manufacturing method of claim 4 or 5, which comprises reacting an aromatic compound of formula (3),



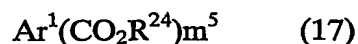
25 wherein Ar^1 is an aryl group which may be substituted or a heteroaryl group which may be substituted; X^1 is a chlorine atom,

a bromine atom, an iodine atom, a trifluoromethanesulfonyloxy group, a methanesulfonyloxy group or a para-toluenesulfonyloxy group; and m^1 is an integer of from 1 to 4, with carbon monoxide and an alcohol of formula (16),



wherein R^{24} is an alkyl group,

to give a carboxylic ester of formula (17),

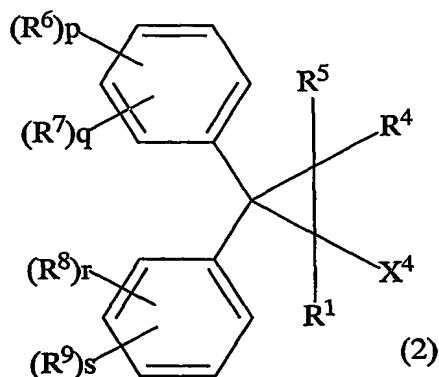


10 wherein Ar^1 and R^{24} are as defined above and m^5 is an integer of 1 to 4.

10. The manufacturing method of unsaturated compounds, as claimed in any one of claims 4 to 9, which comprises carrying out the reaction in the presence of a base.

15

11. A halogeno compound of formula (2) below,



20 wherein R^1 , R^4 and R^5 are each, the same or different, a hydrogen atom, an alkyl group, a cycloalkyl group or a phenyl group which may be substituted; X^4 is a halogen atom; R^6 , R^7 , R^8 and R^9 are each, the same or different, an alkyl group, a cycloalkyl group or a phenyl group which may be substituted, an alkoxy group, a dialkylamino group, a halogen atom, a phenyl group, a benzyl

group, a naphthyl group or a halogenated alkyl group; R^6 and R^7 , and R^8 and R^9 each may be combined to form a fused ring, a trimethylene group, a tetramethylene group or a methylenedioxy group; p , q , r and s are each an integer of from 0 to 5; and

5 $p + q$ and $r + s$ are each in the range of from 0 to 5.